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J. P. Lesley

Report of oil at Brady's Bend, Pennsylvania, 1865.

New York, 1869.

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Fig. 1.

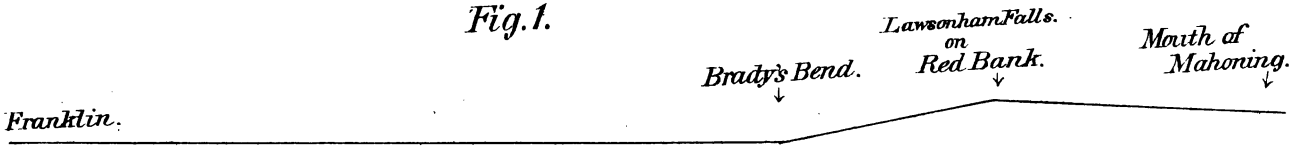

Lawsonham Falls.
on
Red Bank.
Mouth of
Mahoning.
Brady's Bend.
Franklin.

Fig.2.

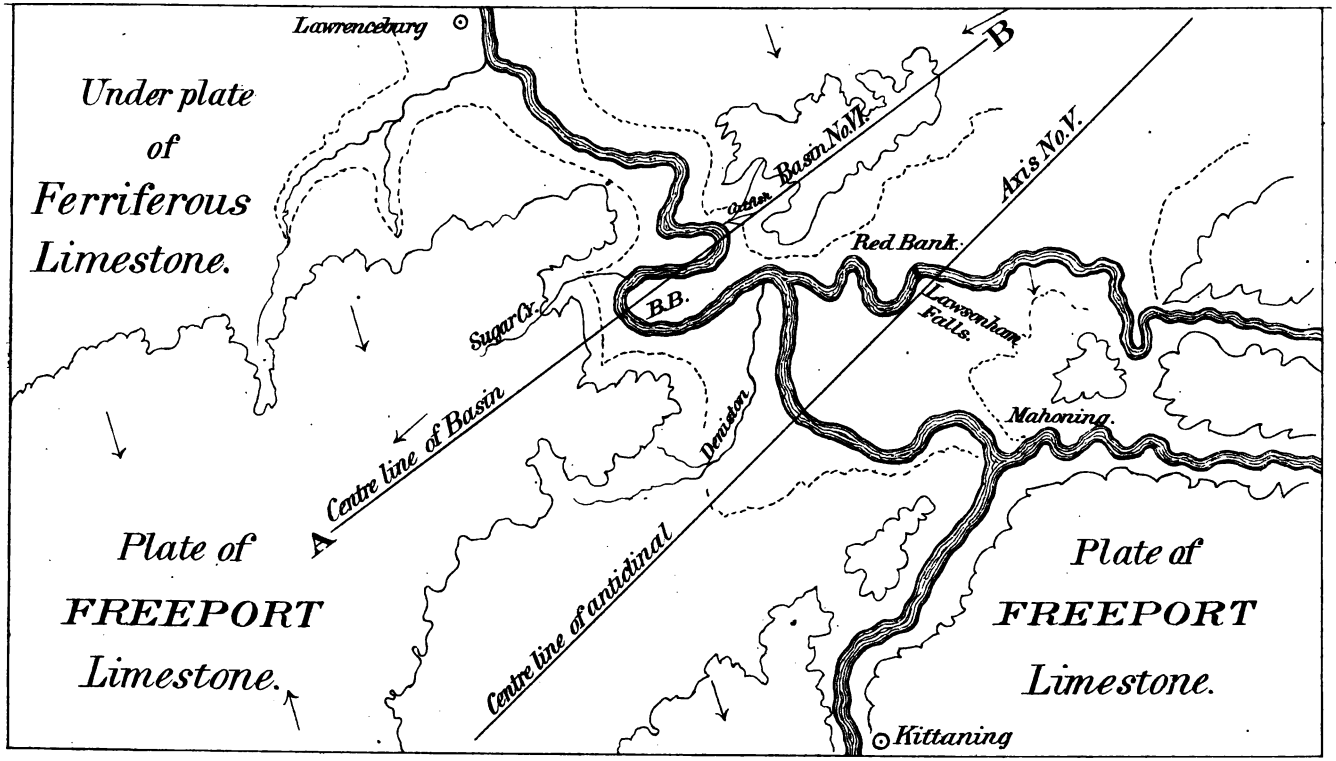

Lawrenceburg
Under plate of Ferriferous Limestone.
B
Axis No.V.
Basin No.VI.
Red Bank
B.B.
Sugar Cr.
Lawrenham Falls.
Mahoning
Centre line of Basin
A
Centre line of antiedinal
Plate of FREEPORT Limestone.
Plate of FREEPORT Limestone.
Kittaning

Fig 3.

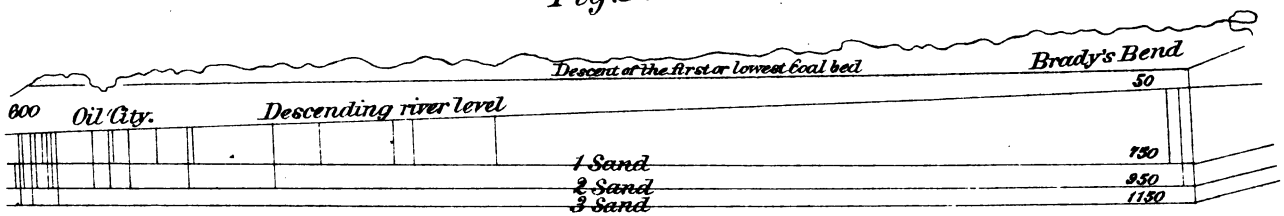
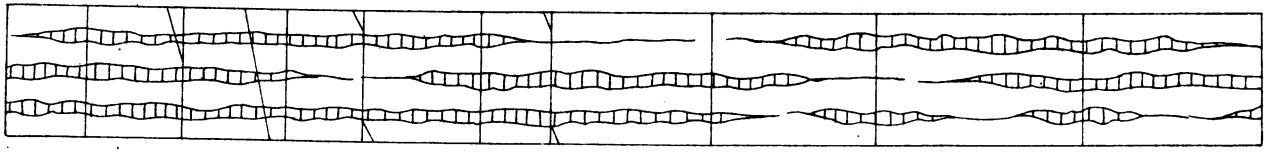

Descent of the first or lowest Coal bed
Brady's Bend
50
800
Oil City.
Descending river level
1 Sand
750
2 Sand
950
3 Sand
1150

Fig. 4.



1016 CLINTON STREET, PHILA.,
March 2d, 1865.

President of the Brady's Bend Iron Co.

BRADY'S BEND occupies the exact centre of a coal basin, where it crosses the Alleghany River. I mean by *centre* the deepest point, or line; for the basin is unsymmetrical; as in figure 1.

The curves in the river at and above Brady's Bend have originated from this deep line of synclinal; and the same cause has operated to bring into the river at this point the Red-Bank waters; as in figure 2.

In this basin has been preserved a pile of coal rocks above five hundred (500) feet thick, with the "Freeport Limestone" near the top, and the "Ferriferous Limestone" near the bottom. The area occupied by the Freeport Limestone, I have drawn on figure 2. The larger area occupied by the lower limestone, I have represented by a dotted line.

The lowest coal bed at Brady's Bend is only about fifty feet above the river-level. Going up the river, this bed gradually rises, faster than the river-level rises; and thus, in the Franklin and Oil City Country, finds itself on the tops of the highest hills, about six hundred feet

above water-level. The bearing of this fact upon the oil-borings is easily shown, by the diagram; figure 3.

The three established horizons of oil-yield on Oil Creek are about 200, 400 and 600 feet below water-level there. They must necessarily be 750, 950, and 1,150 feet below water-level at Brady's Bend—other things being equal.

What are these other things?

The first is the existence of certain gravel or sand beds at those respective depths; in other words, the extension of the Oil Creek Sand Rocks Nos 1, 2 and 3, as far South as Brady's Bend. This question is practically settled: 1st, by the gradual extension of the oil-well borings from Titusville to Emlenton, thirty miles in a straight line, leaving but fifteen miles to make up the rest of the distance to Brady's Bend; 2d, by the oil obtained on Clarion River, Beaver River, and other places, from sand-rocks, which, if not actually, must be virtually the same. All sand and gravel deposits are theoretically local and lenticular in shape, changing their characters constantly, and thinning away, in all directions from a centre or axis, of maximum thickness and coarseness. But it is equally true that when one such lens terminates another commences, and sometimes so as to overlap; and that where there are two or more such sand or gravel deposits in a formation, the formation extends vast distances, and is everywhere characterized by such sand or gravel deposits; as in figure 4.

Such a formation is that which has retained the petroleum of the Alleghany River Country, and the question at Brady's Bend is not whether you have any sand-rocks at about the depths mentioned; or whether you have the Oil Creek and French Creek sand-rocks in a

general way; but, *specifically:* whether you have one, two, three or more sand deposits; whether they are in a good condition; whether the intervals between them remain the same as at Oil Creek, &c.

The second thing to be considered in calculating the depth of your proposed bore-holes, is, therefore, whether the sand-rocks have the same intervals as at Oil Creek. There will undoubtedly be some difference, but not much; because the rocks and their intervals increase from northwest *across* the basins southeastward, and not from northeast *along* the basins southwestward. There will be no *general* change of thickness or interval. But there is no guarantee against some unexpected and undiscoverable *local* change. Whether this will add an extra hundred feet to your bore-holes, or take off an hundred feet, no mortal can predict.

The third thing to be considered, is the possible existence under Brady's Bend of other oil horizons besides those bored for higher up the river. I say nothing here of the *lower* horizon of the Canada petroleum shales and limestones, which you could not reach at a less depth than say two thousand feet. But the Little Beaver petroleum seems to come from a *higher* horizon, not much if any underneath the conglomerate, just under the lowest coal bed; and there are oil regions in Pennsylvania, Ohio, and Virginia which seem to get their petroleum from this same horizon. It is quite *possible*, therefore, that you may obtain oil at a depth of less than two hundred feet, without going down to the first of the Oil Creek gravels.

The fourth thing to be considered is the ruptured condition of the earth crust at Brady's Bend. Numerous

small faults exist in the hill country to the southwest, and, as many may exist in the immediate neighborhood of Brady's Bend, I must question your miners on this head; for these faults are discovered in driving for coal. The formations are nearly horizontal, and the cracks are nearly vertical. If they are numerous, as I believe them to be, in the valley of the Alleghany, about the Bend, the petroleum may be struck *at any depth whatever*, according to the merest accident of placing your well at *a*, instead of at *b*, or *c*, although *a*, *b* and *c* may not be one yard apart. It is this last feature that makes the local success of any given well, even in a productive oil region, such a lottery, and obliges every well regulated oil-boring organization to arrange for sinking a number of wells over a considerable area.

A fifth consideration is, that, in a basin, you have flowing in towards you the underground drainage of salt water (carrying petroleum) from the whole slope to the northwest of you; that is, the drainage of the whole great Sixth Coal Basin is down to and along the line marked *A*, *B* in figure 2. So that, even if petroleum was not originally deposited in the rocks under the Red Bank and Mahoning region, it has been brought thither by underground drainage, and must come up at Brady's Bend through wells bored to depths ranging from two or three to ten or eleven hundred feet.

But as an underground-basin-water-horizon is, so to speak, a unit, and self-supporting, it can be tapped not only along its deepest line, but anywhere up its slope. Otherwise the majority of artesian wells would have been failures, and the Oil Creek region unproductive. I advise, therefore, that your wells be sunk, not in the

Brady's Bend where the oil horizons are deepest, but at the northern and southern limits of your property, *i. e.* as far up the river above the Bend, and as far down the river below the Bend, as you can go upon your own land.

But I must postpone such specific advice until I have again visited the Bend, and am prepared to give you a final report.

Until when I remain, Dear Sir,

Very respectfully yours, &c.,

(Signed.) J. P. LESLEY.

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